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A novel NADH-dependent carbonyl reductase with an extremely broad substrate range from Candida parapsilosis: purification and characterization.

SDS 32 kDa
gel 85 kDa

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64 16
170 43

A novel oxidoreductase catalyzing the NADH-dependent reduction of a variety of carbonyl compounds, especially keto esters, was found in Candida parapsilosis DSM 70125. The enzyme was purified by fractional poly (ethylene glycol) precipitation, anion exchange, and affinity chromatography. The enzyme was enriched about 3100-fold and appeared to be homogeneous as judged by native and sodium dodecyl sulfate gel electrophoresis. The carbonyl reductase from C. parapsilosis is a dimeric enzyme with an apparent molecular mass of about 135 kDa. Important properties concerning the application of the enzyme are the relatively broad pH optimum between pH 6.5 and 9.0, temperature optimum between 36 and 42 degrees C, and good stability. Besides keto esters, the new enzyme reduces other aliphatic, aromatic, and cyclic ketones, as well as aldehydes and ketoacetals with high reaction rates. 4-Halo-3-hydroxybutanoates, which are promising chiral intermediates for the chemical synthesis of L-carnitine, alkaloids and pharmaceuticals, are now accessible by enzymatic reduction, as well as several phenyl-ethanol derivatives, which are important for the synthesis of pharmaceuticals and agrochemicals. The preparative applicability of the enzyme was demonstrated in a coupled enzyme system with regeneration of coenzyme. Methyl 3-oxobutanoate was converted into methyl (S)-(+)-3-hydroxybutanoate (98.5% ee), a versatile chiral building block for the synthesis of pheromones and different antibiotics.

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